

REMARKS

In response to the outstanding Office Action, dated March 27, 2003, Applicants submit the following remarks.

In the outstanding Office Action the Examiner rejected claims 1-6, 10, and 11 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,284,288 to Woodward (hereinafter the Woodward reference). Claims 1-6, 10-14, 16, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,031,483 to Weaver (hereinafter the Weaver reference) in view of "Diffusion Bonding of AISI P20 Tool Steel, author Chicco (hereinafter the Chicco reference). Claims 7-9 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Woodward reference in view of U.S. Patent No. 6,199,259 to Demaray et al. (hereinafter the Demaray reference). Claims 12-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over the Woodward reference in view of the Weaver reference. Applicants have amended claims 1 and 12 to more clearly define the invention. Claims 18-30 have been withdrawn. Claims 1-30 are pending.

The Woodward reference discloses a method of manufacturing an article, such as heat exchangers, components for turbomachines, for example fan blades, fan duct outlet guide vanes (see column 7, lines 1-3). A plurality of titanium sheets 12, 14, 16 are assembled into a stack wherein one of the sheets of an adjoining pair is provided with stop off material formed in desired patterns 26 and 28 on its surface. The stop off material prevents diffusion bonding at the locations of the stop off material. A pipe 42 is positioned to project from the three sheets. The pipe is disposed in a slot 33 formed in the intermediate sheet 14 and in grooves 36 and 40 formed in the sheets 12 and 16, respectively. One end of the pipe interconnects with the pattern of stop off material between the sheets 12, 14 and also with the pattern of stop off material between the sheets 14, 16. The sheets are stacked and then the periphery of the sheets 12, 14, and 16 together. The pipe is also welded to the edges of the sheets. This creates a sealed assembly except for the sole inlet provided by the pipe.

Contrary, Applicants invention as defined in amended claim 1, is a method of making a tool for molding a part such that the tool has a channel formed therein to provide the flow of fluid for heating/cooling the molded part. The Woodward reference does not

teach or suggest a method of making a tool for molding a part such that the tool has a channel formed therein to provide the flow of fluid for heating/cooling the molded part. Instead, the pipe of the Woodward reference provides means for connecting the hollow assembly to a vacuum pump which is used to evacuate the interior of the sealed assembly. Inert gas is then supplied to the interior of the hollow assembly to substantially remove traces of oxygen. The pipe also provides means to evacuate the binder from the stop off material during heating of the assembly. The pipe is sealed at two distinct locations to create a vacuum in the interior of the assembly. The sealed assembly is transferred to an autoclave for diffusion bonding. Inspection of the seals of the pipe determines whether a successful vacuum diffusion process has been obtained. The pipe is removed and a second pipe is fitted therein and argon is introduced into the areas. The argon breaks the adhesive grip between the stop off material and sheets brought about during the diffusion bonding step. The assembly is again heated and argon is introduced into the interior of the integral structure between the adjacent sheets, so as to force the outer sheets 12, 16 into the respective die shapes which generates an internal structure depending on the pattern of the applied stop off. The Woodward reference does not teach or suggest providing tool sections in an unhardened state, wherein each of a number of tool sections has at least one groove in a surface thereof and hole therethrough, and wherein a channel is formed with at least one inlet and outlet at outer walls of the tool sections to provide the flow of fluid through said channel, as is required by Applicants' invention defined in claim 1. Contrary, the Woodward reference teaches away from forming a channel having an inlet and an outlet because the interior of its assembly requires a sealed cavity for evacuating the interior throughout the process. Furthermore, the Woodward reference teaches adding material, such as the stop off material, to form portions not being bonded by a diffusion process. Although a groove 36 and 40 are formed on the sheets 12 and 16, respectively, the grooves and a slot 38 provide means to house an external pipe 42 adjacent the stop off material. For the above reasons, the Woodward reference does not teach or suggest Applicants' invention as defined in claim 1 and, therefore, the claim is patentable over the Woodward reference. Claims 2-11 are dependent on claim 1, and for at least this reason

they also are patentable over the Woodward reference. Therefore, Applicants request withdrawal of the rejection of the claims 1-6, 10, and 11 under 35 U.S.C. §102(b).

With regard to claim 2, there is no teaching or suggestion in the Woodward reference that the facing surfaces of the tool sections include complimentary grooves formed therein and that the tool section are assembled such that the complimentary grooves are in facing relationship to form the channel. With respect to claim 3, there is no teaching or suggestion in the Woodward reference that any grooves are formed at a predetermined cross-sectional configuration that provides the channel with a predetermined cross-sectional configuration after the diffusion bonding step.

The Examiner rejected claims 1-6, 10-14, 16, and 17 under 35 U.S.C. §103(a) as being unpatentable over the Weaver reference in view of the Chicco reference. The Weaver reference discloses a method of forming a tool by means of a providing a plurality of relatively thin laminates 21, 22 (preferably between 0.062 to 0.500 inch thick as stated at column 6, lines 42-46) and bonding them together. A fluid conduit is formed by laser cutting through passageways 50 and 52 of multiple adjacent layers of laminates. As best shown in Fig. 7, multiple passageways must be cut from the adjacent layers of laminates to form a fluid conduit. Thus, the Weaver reference does not teach or suggest providing a plurality of tool sections in an unhardened state, each of a number of the tool sections having at least one of a groove in a surface thereof and a hole therethrough, wherein the tool sections are assembled with surfaces thereof in facing relationship to form a tool block wherein said grooves and holes form at least one channel in said tool block. Contrary, the Weaver reference discloses forming a plurality of through slots formed in a plurality of thin laminates to provide a fluid conduit. As stated in the background of the invention at column 1, lines 33-51, the Weaver reference teaches away from forming conduits and holes to provide heating and cooling conduits due to curved or irregular surfaces. Applicants invention overcomes this problem by providing at least one groove in a surface of the tool section and a hole therethrough, and wherein the tool sections are assembled with surfaces in facing relationship such that the grooves and holes form at least one channel in the tool block.

As stated in the office action, the Weaver reference does not teach a method of making a tool including diffusion bonding the facing surface and heating and cooling the diffusion bonded tool, as is required by Applicants invention as defined in independent claims 1 and 12. As stated at column 7, lines 5-10 of the Weaver reference, the laminations 22 are bonded together after stacking such as by adhesives brazing, welding, and mechanical fasteners. The Examiner asserts that it would have been obvious to one having ordinary skill in the art to modify the teachings of the Weaver reference with the teachings of the Chicco reference in order to produce a toll with high bond strength, microstructural integrity and low distortion while reducing time and cost of manufacturing. However, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the applied reference (or references when combined) must teach or suggest all the claim limitations. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Further, the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. The teaching or suggestion to modify the reference or make the claimed combination, and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. MPEP §2143. Applicants assert that there is no motivation to combine these references, and to do so is mere hindsight. There is nothing in the teachings of the Weaver and Chicco references to suggest the desirability of combining the method of forming a tool by multiple thin laminates by diffusion bonding. For the above reasons, the Weaver and Chicco references do not teach or suggest Applicants' invention as defined in claims 1 and 12, and, therefore, the claims are patentable over the references. Claims 2-11 and claims 13-17 are dependent on claims 1 and 12, respectively, and for at least this reason they also are patentable over the Weaver

and Chicco references. Therefore, Applicants request withdrawal of the rejection of the claims 1-6, 10-14, 16, and 17 under 35 U.S.C. §103(a).

With regard to claim 2, there is no teaching or suggestion in the Weaver reference that the facing surfaces of the tool sections include complimentary grooves formed therein and that the tool section are assembled such that the complimentary grooves are in facing relationship to form the channel. Contrary, the Weaver reference discloses multiple layers of laminate which must be formed by cutting, such as a laser, with through passageways to form a fluid conduit. With respect to claim 3, there is no teaching or suggestion in the Weaver reference that any grooves are formed at a predetermined cross-sectional configuration that provides the channel with a predetermined cross-sectional configuration after the diffusion bonding step.

Regarding the rejection of claims 8-9 under 35 U.S.C. §103(a), the Examiner states that the Demaray reference teaches a method of diffusion bonding materials including grinding and polishing the facing surfaces prior to bonding in order to provide an exceptional leak tight seal. However, the Demaray reference does not teach or suggest providing a bond between the tool section that includes imperfections (as required by claim 8) or that the tool sections include imperfection for permitting nondestructive separation of the bonded tool sections (as require by claim 9). As stated at page 27, line 10 through page 28, line 12, providing a non-optimum bond by controlling the finish facing surfaces enables replacement of worn parts of the tool without replacing the entire tool.

The Examiner rejected claims 12-17 under 35 U.S.C. §103(a) as being unpatentable over the Woodward reference in view of the Weaver reference. As discussed above, the Woodward and the Weaver references do not teach or suggest providing tool sections in an unhardened state, wherein each of a number of tool sections has at least one groove in a surface thereof and hole therethrough, and wherein a channel is formed with at least one inlet and outlet at outer walls of the tool sections to provide the flow of fluid through said channel, as is required by Applicants' invention defined in claim 1. Contrary, the Woodward reference teaches away from forming a channel having an inlet and an outlet because the interior of its assembly requires a sealed cavity for evacuating the interior throughout the process. As stated in the office action, the Woodward reference

does not teach or suggest cutting a body of tool material in an annealed state into layers with opposing surfaces. Applicants also assert that the Weaver reference does not teach or suggest cutting a body of tool material in an annealed state into layers with opposing surfaces. The Weaver reference discloses at column 6, lines 42-46 that the laminates are selected from readily available standard sized stock. There is no teaching or suggestion of cutting a body of tool material in an annealed state into layers with opposing surfaces. Although the Weaver mentions at column 2, lines 7-26 that molds are primarily produced from solid blocks of material, this statement is made in the background of the application and relates to blocks wherein the material cut away and scraped. The Weaver reference further states that to avoid this cutting time, the mold is constructed of a plurality of planar laminations. For these reasons, the combination the Woodward and Weaver references do not teach or suggest Applicants' invention as defined in claim 12 and, therefore, the claim is patentable over the references. Claims 13-17 are dependent on claim 12 and for at least this reason they also are patentable over the Woodward and Weaver references. Therefore, Applicants request withdrawal of the rejection of the claims 12-17 under 35 U.S.C. §103(a).

In view of the amendments and above remarks, it is believed that the application is in condition for allowance. Accordingly, an early Notice Of Allowance is respectfully requested.

Any fees due in connection with this Amendment should be charged to Deposit Account No. 13-0005.